Specification

Method of and Device for Making an Electrooptical Component

The present invention relates to a method according to claim 1 and to a device according to claim 5, with both the method and the device being provided for making an electrooptical component.

Methods known so far for making an electrooptical component, in particular a diode required for example for an optical connector, comprise the following steps: casting the diode in a broken or dead mold, with the dead mold constituting the housing of the electrooptical component and the housing having a coupling portion for connecting e.g. an optical waveguide. Casting takes place preferably by means of a transparent resin. Prior to the casting operation proper, an opening, a so-called optical window, must therefore be closed in the dead mold. In case of the known casting mold, said closing takes place by a molded-on closure plug that is broken off via a predetermined breaking edge after the casting operation.

However, in the region of the optical window, it is necessary to have a highly accurate surface of the resin. The light emitted by the diode during subsequent operation and coupled into the optical waveguide (or vice versa) must be transmitted into the optical waveguide in as loss-free manner as possible. To this end, it is necessary to have a defect-free, plane surface of the optical window.

In case of the known, molded-on closure plug, the surface forming this optical window is located inside the casting mold and thus can be manufactured with utmost difficulties only. The result thereof are electrooptical components which are not usable due to the poor quality of the optical window, and in particular due to the inaccurate surface of the casting resin.

Accordingly, it is the object of the present invention to make available a method of and a device for making an electrooptical component, by means of which manufacture can be carried out virtually without rejects, with the surface of an optical window at the electrooptical component being formed as exact and defect-free as possible.

This object is met by a method according to claim 1 and a device according to claim 5, respectively.

Accordingly, the method of making an electrooptical component according to the invention, comprising a molded body of a transparent moldable material, with said molded body being molded in a dead mold by casting and said casting mold having a casting opening for introducing a carrier of an electrooptical transducer, and said casting mold having a coupling portion for a coupling partner, comprises the following steps:

- introducing a closure means into the coupling portion;
- filling the moldable material into the casting mold;
- introducing the carrier through the casting opening into the casting mold and aligning the carrier in relation to the mold by means of at least one positioning means;
- curing the moldable material; and
- removing the closure means.

A device according to the invention according to claim 5 is provided as casting mold for making an electrooptical component comprising a molded body of a transparent moldable material, said molded body being molded in a dead mold by casting, the mold having a casting opening for introducing a carrier of an electrooptical transducer, the mold having a coupling portion for a coupling partner, and a closure means closing an opening in the coupling portion of the mold during casting.

Preferred developments of the device according to the invention and of the method according to the invention for making an electrooptical component are subject matter of dependent claims.

The present device and the present method will be elucidated in more detail hereinafter with reference to the related drawings.

In the drawings:

Fig. 1 shows a perspective view of a device according to the invention according to a first preferred embodiment of the present invention;

Fig. 2 shows a side view of the device according to Fig. 1;

Fig. 3 shows a cross-sectional view of the device according to Figs. 1 and 2;

Fig. 4 shows a side view of the device according to Fig. 2, with the closure means being engaged with a casting mold;

Fig. 5 shows a cross-sectional view of the device

according to Fig. 4;

Fig. 6 shows a perspective view of the device according to Figs. 4 and 5;

Fig. 7 shows a perspective view of a second embodiment of the device according to the present invention;

Fig. 8 shows a side view of the device according to Fig. 7;

Fig. 9 shows a cross-sectional view of the device according to Figs. 7 and 8; and

Fig. 10 shows an additional perspective view of the device of Figs. 7 to 9, with the closure means being disengaged from the casting mold.

Fig. 1 depicts a casting mold 1 according to a first embodiment of the present invention, with this casting mold 1 having substantially the shape of a right parallelepiped and being provided with a casting opening 2 at the top side (in Fig. 1) and with a coupling portion 3 at a lateral area.

Coupling portion 3 is of hollow-cylindrical configuration and comprises an opening 5 (cf. Fig. 3) that serves as an optical window.

In the finished state of the electrooptical component, preferably an optical waveguide (not shown) is connected to coupling portion 3. The diode in the interior of the electrooptical component can thus emit light, and this light can be transmitted via the optical window, i.e. the opening 5, to the optical waveguide.

The optical waveguide is mechanically connected to the electrooptical component by means of an insert or ferrule in coupling portion 3. To this end, there is provided a latching means 8 that is in the form of an annular snap-type connecting mechanism.

In the method of making the electrooptical component, the casting mold 1 is first closed by a closure means 4. In particular, the opening 5 is closed which later on is required as optical window. After insertion of a carrier of an electrooptical transducer (e.g. a diode) into casting mold 1, said carrier is positioned within casting mold 1. With the aid of a positioning means (not shown), which may be designed e.g. as complementary abutment areas, the carrier may be aligned exactly in the casting mold.

Thereafter, a liquid transparent resin is filled into casting mold 1 through casting opening 2 and preferably is cured at a temperature of approx. 160° C.

After removal of closure means 4, the electrooptical component is completed.

The sequence of the afore-mentioned method steps can be carried out either in conformity with claim 1 or in the manner indicated hereinbefore. According to claim 1, the resin is filled in first, and the carrier is introduced and positioned thereafter.

Due to the required very accurate and defect-free (i.e. no scratches, corrugations etc.) surface of the optical window of the resin, the closure means 4 is polished in the region of the sealing area 7 or window area 11 which later on constitutes the optical window.

Due to the fact that the closure means 4 becomes a

constituent part of casting mold 1, the closure means 4 can be worked in optimum manner in this area and can be matched to the requirements.

Closure means 4 is of punch-like configuration and is positioned exactly via a centering means 10 which in the instant case is in the form of a cylindrical generated surface that is brought into abutment with the inner circumference of latching means 8. In this respect, a latching means 8 is of advantage which, by means of inclined abutment areas, permits a certain tolerance in axial direction of the components.

After curing of the resin filled into casting mold 1, closure means 4 is removed. Preferably, there is provided a releasing means 9 to this end which, in accordance with the clothespin principle, disengages the latching means 12 on closure means 4 from the latching means 8 of casting mold 1.

The sealed nature between casting mold 1 and closure means 4, which is required for casting, is obtained by the circumferential edge 6 of opening 5, that is closely abutted with sealing area 7. Both sections, i.e. the edge 6 and the sealing area 7 that is designed as taper, may also be worked very accurately by polishing.